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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,882	12/03/2003	Mehmet Arik	RD30892/130333	5383

7590 10/21/2004

Scott A. McCollister
Fay, Sharpe, Fagan
Minnich & McKee, LLP, 7th Floor
1100 Superior Avenue
Cleveland, OH 44114-2518

EXAMINER	
HAN, JASON	

ART UNIT	PAPER NUMBER
2875	

DATE MAILED: 10/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/726,882	ARIK ET AL.	
	Examiner	Art Unit	
	Jason M Han	2875	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/03/2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: synthetic jet actuator "170" in Figure 10 [Page 12, Lines 27-28]; flexible hinge "208" in Figure 18 [Page 14, Lines 16-17]. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

   a. Page 11, Line 9: "Figure 13" should read as "Figure 12";

   b. Page 11, Line 10: "Figure 14" should read as "Figure 13";

   c. Page 12, Line 21: please insert "be" after "can".

   Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148).

3. With regards to Claim 1, Morris discloses a lamp thermal management method and apparatus having a housing [Figures 2-6: (54)], wherein there is a heat dissipating structure [Figures 2-6: (60, 66)] in thermal communication with a light source [Figures 2-6: (52)], and a fluid current generator [Figure 2-6: (78)] for creating a current over the heat dissipating structure [Page 3, Paragraph 24] and which further includes a piezoelectric material [Figures 4-5: (88)].

Though Morris does not specifically teach the light source disposed in the housing being an LED, it is obvious that one could easily adapt the invention to incorporate such, and is a matter of design preference. To quote Morris, "For example, the light source 52 may comprise a high-intensity discharge (HID) lamp, a halogen lamp, quartz lamp, an ultrahigh pressure (UHP) lamp, a ceramic metal halide (CMH) lamp, a high-pressure sodium (HPS) lamp, yttrium-aluminum-garnet (YAG) lamp, a sapphire lamp, a projector lamp, and so forth [Pages 1-2, Paragraph 16]."

4. With regards to Claim 2, Morris teaches the fluid current generator including a blade of flexible material [Figures 4-5: (86)], wherein the blade is spaced from a surface

of the heat dissipating structure such that an attached end of the blade can move in relation to the surface.

5. With regards to Claim 3, Morris teaches a pedestal [Figures 4-5: (88)] extending from the surface of the heat dissipating structure [Figures 2-6: (74); Page 2, Paragraph 22, last sentence] and wherein the blade is attached to the pedestal such that the blade is spaced from the surface. Please further observe that Morris does teach all the above-mentioned components in thermal communication [Figures 3, 6: note the middle connection (not labeled)].

6. With regards to Claim 4, Morris teaches the pedestal having a width at least equal to the width of the blade [Figure 4].

7. With regard to Claims 5-6, the examiner considers the above reference functionally equivalent in providing a cooling means, and again considers the limitation a matter of design preference and of fluid dynamics. At the applicant's admission, "the current generator blade is extended outward, it acts as a conventional vortex generator protruding from the surface, helping to prevent flow separation [Page 10, Lines 17-20; underline added for emphasis]." Please further note that Morris does teach a vortex flow [Figure 6: (102, 104); Page 3, Paragraph 26, last sentence], and that it is obvious that the invention of Morris could easily be designed to incorporate a desired convection within the system. In addition, Morris discloses, "In operation, the piezoelectric bending element 88 oscillates the flexible blade 86 at its resonant vibration, thereby forming a unidirectional flow stream as indicated by arrows 92. Again, the present technique may utilize other suitable air-moving devices depending on the desired application, size

constraints, desired characteristics, and so forth. In any of the embodiments of the present technique, one or more of these air-moving devices 78 may be disposed within the housing 54 to force convective heat transfer. The air-moving devices 78 may be oriented in the same direction, in opposite directions, or in any other configuration to achieve the desired circulation within the housing 54 [Page 3, Paragraph 24]."

8. With regards to Claim 7, Morris teaches heat sinks extending from a heat dissipating structure [Figure 7: (112, 114); Figure 8: (126), Page 4, Paragraph 29; Figure 9: (130), Page 4, Paragraph 30; Figure 11: (172)].

9. With regards to Claim 8, Morris teaches a pedestal [Figures 4-5: (88)] extending from the surface of the heat dissipating structure [Figures 7: (74); Figures 8-11: (120, 124, 126)] and wherein the blade is attached to the pedestal such that the blade is spaced from the surface. Please further observe that Morris does teach all the above-mentioned components in thermal communication [Figures 7-11; note the middle connection (not labeled)].

10. With regards to Claim 9, Morris teaches the pedestal being spaced form the plurality of fins to define a gap there between [Figure 11: (78, 172)].

11. With regards to Claim 10, please note Paragraph 7 above.

12. With regard to Claims 11-12, please note Figure 6 as well as Paragraph 7 above.

13. With regards to Claim 13, Morris teaches the heat dissipating structure including a printed circuit board [Figure 6: (74)].

14. With regards to Claim 14, please note Paragraphs 4 and 7 above.

15. With regards to Claim 15, Morris teaches the heat dissipating structure including a surface defining an opening and the blade mounted substantially flush with the surface [Figure 5]. It should be again noted that the examiner considers the above reference functionally equivalent in providing a cooling means, and considers the limitation a matter of design preference.

16. With regards to Claim 16, Morris teaches a vortex flow [Figure 6: (102, 104); Page 3, Paragraph 26, last sentence], and it is obvious that the invention of Morris could easily be designed to incorporate a desired convection within the system. In addition, Morris discloses, "In operation, the piezoelectric bending element 88 oscillates the flexible blade 86 at its resonant vibration, thereby forming a unidirectional flow stream as indicated by arrows 92. Again, the present technique may utilize other suitable air-moving devices depending on the desired application, size constraints, desired characteristics, and so forth. In any of the embodiments of the present technique, one or more of these air-moving devices 78 may be disposed within the housing 54 to force convective heat transfer. The air-moving devices 78 may be oriented in the same direction, in opposite directions, or in any other configuration to achieve the desired circulation within the housing 54 [Page 3, Paragraph 24]."

17. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148) as applied to Claim 1 above, and further in view of Edelman et al. (U.S. Patent 4501319).

Morris teaches a lamp thermal management method and apparatus having a fluid current generator as cited above.

Morris does not specifically teach the fluid current generator having two flexible side plates connected together by a flexible hinge.

Edelman discloses a piezoelectric polymer heat exchanger having multiple flexible plates [Figure 3A: (20)] being connected by a rectangular housing [Figure 3A: (10)]. Though Edelman does not specifically state whether the housing is of a flexible material, the examiner considers the reference functionally equivalent to the limitation in providing support to the plates [Column 3, Lines 46-49].

It would have been obvious to modify the fluid current generator of Morris to incorporate the piezoelectric polymer heat exchanger of Edelman in order to provide increased heat transfer efficiency, whereby multiple channels could be provided in venting cold air within and hot air out of the system [see Abstract of Edelman].

18. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148) in view of Edelman et al. (U.S. Patent 4501319) as applied to Claim 17 above, and further in view of Edelman et al. (U.S. Patent 4406323).

Morris in view of Edelman (U.S. Patent 4501319) teach a lamp thermal management system with a piezoelectric polymer heat exchanger as cited above.

Neither Morris nor Edelman specifically teach the piezoelectric polymer heat exchanger having two layers of piezoelectric material surrounding a flexible material.

Edelman (U.S. Patent 4406323) teaches a piezoelectric polymer sheet wherein the sheet includes two layers of piezoelectric material [Figure 3: (28, 30)] surrounding a flexible material [Figure 3: (32)].

It is obvious that the latter patent of Edelman (U.S. Patent 4501319) incorporates the teaching of the former (U.S. Patent 4406323). It is also obvious that by surrounding a flexible material with two layers instead of one piezoelectric layer, a greater pressure force may be exerted in creating a stronger fluid current generator.

19. Claims 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148) in view of Edelman et al. (U.S. Patent 4501319) as applied to Claim 17 above, and further in view of Edelman et al. (U.S. Patent 4406323).

20. With regards to Claim 20, Edelman teaches the piezoelectric polymer sheet in an earlier patent (U.S. Patent 4406323), wherein the sheet includes two layers of piezoelectric material [Figure 3: (28, 30)] surrounding a flexible material [Figure 3: (32)].

21. With regards to Claim 21, Edelman (U.S. Patent 4501319) teaches the multiple flexible plates having an inner cavity wherein conduits/channels are created in providing heat transfer flow [Figures 3A-3B].

22. With regard to Claims 22-24, Edelman (U.S. Patent 4501319) teaches a cylindrical/tubular construction type of piezoelectric polymer partitions [Figures 4, 6A-6D] whereby heat transfer flows through an orifice [Figure 4: (48, 50)]. It should be noted that Morris also teaches a heat pipe [Figure 10: (142); Figure 11: (162, 164)], which could be modified with the cylindrical/tubular construction of piezoelectric polymer, as taught by Edelman, in order to improve heat transfer efficiency. With respect to tapering and multiple orifices, the examiner considers the above references

functionally equivalent and a matter of design preference for desired fluid dynamics within the system.

23. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148) in view of Edelman et al. (U.S. Patent 4501319) as applied to Claim 17 above, and further in view of Barnett et al. (U.S. Patent 6541800).

Morris in view of Edelman teach a lamp thermal management system as cited above.

Neither Morris nor Edelman specifically teach the system having an LED mounted onto a die.

Barnett discloses a high power LED including a die for supplying electrical power to the LED package, and a heat sink secured to the die [Column 3, Lines 22-32].

It would have been obvious to modify the lamp thermal management system of Morris with the piezoelectric polymer heat exchanger of Edelman to further incorporate an LED mounted on a die as taught by Barnett, which is commonly held and seen within the art, in order to provide electrical as well as thermal communication for the LED.

24. Claims 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148) as applied to Claim 1 above, and further in view of Edelman et al. (U.S. Patent 4501319).

Morris teaches a lamp thermal management method and apparatus having a fluid current generator as cited above.

Morris does not specifically teach the fluid current generator having two flexible side plates connected together by a flexible hinge.

Edelman discloses a piezoelectric polymer heat exchanger having multiple flexible plates [Figure 3A: (20)] being connected by a rectangular housing/hinge [Figure 3A: (10)]. Though Edelman does not specifically state whether the housing/hinge is of a flexible material, the examiner considers the reference functionally equivalent to the limitation in providing support to the plates [Column 3, Lines 46-49].

It would have been obvious to modify the fluid current generator of Morris to incorporate the piezoelectric polymer heat exchanger of Edelman in order to provide increased heat transfer efficiency, whereby multiple channels could be provided in venting cold air within and hot air out of the system [see Abstract of Edelman].

25. With regards to Claim 26, both Morris [Figures 3, 6, 7, 11: (78)] and Edelman [Figures 3A-3B] teach multiple current fluid generators.

26. With regards to Claim 27, Edelman, as cited above, teaches multiple flexible plates creating a plurality of fluid current generators wherein several internal cavities are defined [Figures 3A-3B].

27. With regards to Claim 28, Morris teaches a plurality of fins [Figure 11: (172)] extending from the heat dissipating structure.

28. With regard to Claims 29 and 30, Morris teaches the fins radiating from a central point of the heat dissipating structure, and a fluid current generator positioned adjacent the central point of the heat dissipating structure [Figure 11]. It should again be noted that the examiner considers such a configuration a design preference for desired fluid dynamics within the system.

29. With regard to Claims 31 and 32, Edelman, as cited above, teaches multiple flexible plates creating a plurality of fluid current generators wherein a plurality of openings are defined for current flow [Figures 3A-3B]. Though Edelman does not teach the housing/hinge having multiple openings on one side, the examiner considers the reference functionally equivalent to the limitation in providing support to the plates [Column 3, Lines 46-49]. The examiner further considers such a configuration a design preference with respect to fluid dynamics whereby a different opening (front/back) or openings may be provided in directing the flow in a preferred manner.

30. With regards to Claim 33, Edelman, as cited above, teaches multiple flexible plates creating a plurality of fluid current generators wherein a plurality of openings are defined for current flow [Figures 3A-3B]. It should be noted that the above reference is functionally equivalent in providing fluid flow in different/opposite directions [Figures 3A-3B].

31. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris et al. (U.S. Publication 2004/0120148) in view of Glezer et al. (U.S. Patent 6588497).

Morris discloses a lamp thermal management method and apparatus having a housing [Figures 2-6: (54)], wherein there is a heat dissipating structure [Figures 2-6: (60, 66)] in thermal communication with a light source [Figures 2-6: (52)], and a fluid current generator [Figure 2-6: (78)] for creating a current over the heat dissipating structure [Page 3, Paragraph 24] and which further includes a piezoelectric material [Figures 4-5: (88)]. Though Morris does not specifically teach the light source disposed

in the housing being an LED, it is obvious that one could easily adapt the invention to incorporate such, and is a matter of design preference. To quote Morris, "For example, the light source 52 may comprise a high-intensity discharge (HID) lamp, a halogen lamp, quartz lamp, an ultrahigh pressure (UHP) lamp, a ceramic metal halide (CMH) lamp, a high-pressure sodium (HPS) lamp, yttrium-aluminum-garnet (YAG) lamp, a sapphire lamp, a projector lamp, and so forth [Pages 1-2, Paragraph 16]."

Morris does not teach the lamp having a synthetic jet actuator disposed in the housing for generating a current of fluid to cool the lamp.

Glezer teaches a thermal management system utilizing a synthetic jet actuator for cooling the system.

It would have been obvious to modify the lamp of Morris to incorporate a synthetic jet actuator of Glezer in order to provide a cooling means for the lamp without the use of a fan. To quote Glezer, "Traditionally, the need for cooling microelectronic devices has been met by using forced convective cooling with or without heat sink devices. Forced convection is effected using fans which provide either global overall cooling or locally-based cooling... Use of a fan also requires relatively large moving parts in order to have any success in cooling a heated body or microelectric component. These large moving parts naturally require high power inputs [Column 1, Lines 39-49]."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following references have been cited to further show the state of the art pertinent to the current application:

U.S. Patent 3464672 to Massa;

U.S. Patent 4490649 to Wang;

U.S. Patent 4503358 to Kamei et al;

U.S. Patent 4590399 to Roxlo et al;

U.S. Patent 4630182 to Moroi et al;

U.S. Patent 4667877 to Yao et al;

U.S. Patent 4763225 to Frenkel et al;

U.S. Patent 4941398 to Morris et al;

U.S. Patent 5008582 to Tanuma et al;

U.S. Patent 5130912 to Fiederichs et al;

U.S. Patent 5136489 to Cheng et al;

U.S. Patent 5335143 to Maling et al;

U.S. Patent 5758823 to Glezer et al;

U.S. Patent 5785418 to Hochstein;

U.S. Patent 5861703 to Losinski;

U.S. Patent 5921757 to Tsutsui et al;

U.S. Patent 6123145 to Glezer et al;

U.S. Patent 6252726 to Verdielli;

U.S. Patent 6318886 to Stopa et al;

U.S. Patent 6333852 to Lin;

U.S. Patent 6451175 to Lal;

U.S. Patent 6457654 to Glezer et al;

U.S. Patent 6511209 to Chiang;

U.S. Patent 6517221 to Xie;

U.S. Patent 6554607 to Glezer et al;

U.S. Patent 6770960 to Oohata;

U.S. Publication 2001/0030866 to Hochstein;

U.S. Publication 2003/0177899 to Monson et al.;

JP 62-072149 to Matsumura;

EP 0385090A1 to Nelson;

Spot-cooling by Confined, Impinging Synthetic Jet to Glezer et al;

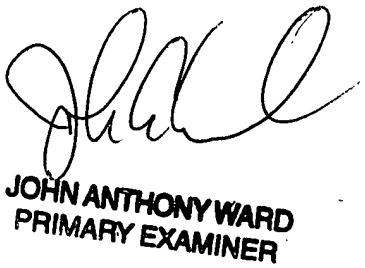
Engineers create tiny, wiggling fans to cool future electronics to Venere.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Han whose telephone number is (571) 272-2207. The examiner can normally be reached on 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (571) 272-2378. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMH



JOHN ANTHONY WARD
PRIMARY EXAMINER